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ABSTRACT

Under the old system of trade skills education, instruction was delivered largely through kinesthetic methods. Currently, however, secondary and postsecondary trade skills education programs institutions in Australia and elsewhere are changing their educational emphasis from traditional skills to more technology-based skills. This shift raises the question of whether modern theories and technologies are more beneficial than traditional methods in which educators remain in control of content and time. Hybrid instruction, which combines face-to-face classroom instruction with computer-based learning, is one approach to integrating technology into the classroom. Although hybrid instruction allows for flexibility and gives students the opportunity to be more self-directed, it suffers in the application of kinesthetic skills to learning. Several Australian institutions, including the International Wine Academy of Australia, are now offering programs that require students to use touch and other senses. Two relevant areas of research are haptics (the experience of touching and manipulating objects or environments) and virtual synesthesia (a neurological condition in which a stimulus in one sense modality is involuntarily elicited in another). SmartRooms, which constitute another way of integrating technology into instruction, have the potential to incorporate kinesthetic learning into theory-based curricula. Institutions opting to integrate technologies in the classroom must avoid bifurcated teaching that emphasizes the theoretical over the practical. (Contains 14 references.) (MN)

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THE USES AND APPLICATIONS OF LEARNING TECHNOLOGIES IN THE MODERN CLASSROOM: FINDING A COMMON GROUND BETWEEN KINAESTHETIC AND THEORETICAL DELIVERY

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MARCH 2003

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The importance of tertiary education, and in particular trade skills education has become very apparent over the past few years. Traditionally, the focus in pursuing higher education was on obtaining a university degree, which in turn would lead to post graduate studies. However, with the advent of community colleges, those traditional ideas are changing with more students focussing on obtaining technical skills as opposed to university degrees. The education and training of so-called knowledge workers suggests that this integration trend will predominate in the twenty first century (Wilson, 2001).

Historically, technical skills such as plumbing, cooking and electronics were often taught and learned through apprenticeship and hands-on learning. This process often included mentorship, with a qualified journeyman being responsible for the apprentice and ultimately "signing off" on the apprentice's hours. With the introduction and integration of community college education for technical skills, the paradigm has changed, and it appears that traditional apprenticeships are becoming obsolete. Presently, one of the trends is to adapt a Co-Op model, in which students learn in school and then work as part of their curriculum. Cooperative education is a distinctive form of experiential learning in which students have the opportunity to integrate academic theory with applied learning in the workplace. This mixture of theory and reality often proves beneficial to its participants, providing them with a dose of reality in regards to their chosen career path.

Under the old system, which involved apprenticeship, the ways of learning were often kinaesthetic, done by applying theory that had been taught, either formally or informally. Currently, the emphasis in the delivery of the curriculum is put on the theory, to be followed up by actually performing the skill. The curriculum is often delivered by the use of technology, including audio-visual, virtual communities and on-line learning. Unfortunately, by using such technologies, the application of kinaesthetic learning may suffer.

Educational institutions, both at a secondary and tertiary level are in the process of changing their educational emphasis from traditional trade skills to those that are more technology based. With this shift, the delivery of curriculum to non-technology based courses is often neglected, and is, at times, forced to embrace technological applications, even when this may not be appropriate. For example, a PowerPoint presentation could inform a culinary student that a fresh fish has clear eyes, bright red gills, a slimy feel to the skin and fresh odour. The question remains whether the student could truly comprehend those qualities with out actually touching or seeing that fresh fish. Can computer–mediated interaction substitute for the human interaction that is at the heart of learning (Ross, 2000)? This not to say, however, that technology should not be absent from the classroom.

Educational institutions do not exist in a vacuum. They are influenced by societal events constantly occurring around them (Treuhaft, 1995). Those institutes of higher learning are responding not only to society, but also to the industries that are the driving forces behind the demand for skilled and educated labour. The underlying issue remains whether the use of modern learning theories and technologies are more beneficial than the traditional

telling method (Ericson, 1960) in which educators remain in control of content and time (Kim and Kellough, 1987).

The use of technology in the classroom does not only revolve around educational quality. It also encompasses the reality of monetary constraints. Too often institutions are using technological delivery methods as a "quick fix for pedagogical or budgetary ends" (Ross, 2000), this being part of an ongoing power struggle between administrators and practitioners, based on quality of information versus allotted time. Students are repeatedly herded into a lecture hall where a professor, perhaps with the aid of television monitors, will demonstrate a skill, which the students are then expected to master, based on that demonstration alone. The assumption on the part of administration is that all the students are able to see it and therefore should be able to comprehend, if not master it. How many of them truly experience it? Why are the students subjected to this? Quite simply put, budgetary and space constraints may often prevent smaller, more intimate learning environments. This "laissez faire" attitude among educators has produced a disturbing lack of critical thinking about the impact of technology and online instruction on education (Ross, 2000).

Another issue concerns the manner in which the instructors embrace the use of technology within the classroom. Some are very resistant, primarily due to their fear of the unknown - that being the new technologies, which they may have difficulty learning and mastering. Failure to learn or embrace these technologies may also be seen as an act of resistance or defiance against an administration, which is encouraging, if not demanding compliance, of the use of new technology based delivery methods.

Conversely, there are those instructors who are now totally technology dependent, which despite their best intentions, may result in students who are suffering from "PowerPoint fatigue" (Elizabeth Burge, personal communication, January 30, 2003). Those PowerPoint presentations often include animation, but can they be truly animated like a good educator who has engaged the learning audience?

One approach to the integration of technology into the classroom is known as Hybrid Instruction. It is also referred to as mediated learning, blended learning and web-enhanced instruction. In some ways it is the middle ground between our society's adolescent love affair with technology and ancestral need for human contact and a sense of belonging (Landau, 2003). Hybrid courses and hybrid degree programs promise the best of both worlds, offering some of the convenience of all on-line courses without the complete loss of face to face contact (Young, 2000).

But just what is 'Hybrid Instruction'? Hybrid is the label commonly used to describe course that combine face-to-face classroom instruction with computer based learning (Murphy, 2003). It could be argued that the use of videos, books and supplementary materials also constitute a hybrid approach. However, in today's wired age, most hybrid approaches involve computers and the Internet.

Hybrid Instruction has both its strengths and weaknesses. This approach to education allows for flexibility. Students are not restricted to the classroom, having access to their course content and assignments 24/7. Students have the opportunity to be more self-directed. Conversely, those students might go off on tangents and not follow the course of study as identified in the syllabus.

Some teachers also feel that with the on-line environment, they have less control than they would in a traditional setting.

One area in which Hybrid Instruction suffers is the application of kinaesthetic skills to learning. Research indicates that the average retention rate of knowledge after twenty-four hours for a lecture is five percent while after practice by doing is seventy five percent (Sousa, 2001). The incorporation of kinaesthetic learning through hybrid instruction remains a challenge. In some instances, the distance-learning component of Hybrid Instruction will allow a student, by audio or video means, to address two identified learning styles, those being visual and aural. But at this point in time, it is almost impossible for a student to experience touch, taste or smell via distance learning.

It should be noted that there have been attempts to incorporate the use of smell in conjunction with visual presentations. In the early Sixties, there was a fad gimmick known as "Smell-O-Vision", conceived by Mike Todd Jr., in which aromas or scents were pumped into a movie theatre in conjunction with certain scenes. As recently as 1982, film director John Waters incorporated "Odorama", with similar objectives. In this scenario, various scents were delivered to the audience via scratch and sniff cards. It would be interesting to see if this concept could be further developed and applied in a classroom scenario.

The International Wine Academy of Australia currently offers a wine training kit that incorporates a video, textbook, aroma wheel, fragrances and component pouches. The needs of the different senses, other than touch, have been addressed. The Academy plans on offering a distance-learning course in the near future, which, upon completion, will lead to certification as a Wine

Advisor, recognized by three universities in Australia. Is this the future of wine education and appreciation? Can this model be applied to other foodstuffs? It will be interesting to observe and evaluate the success of the International Wine Academy of Australia's program.

Haptics is the experience of touching and manipulating objects or environments. Current Internet delivered curriculum does not allow for this, however there is a substantial amount of research about haptic interfaces. A haptic interface is a force reflecting device, which allows a user to touch, feel, manipulate, create and/or alter, simulated three-dimensional objects in a virtual environment (Human Performance Centre, 2000). Such interfaces would be useful in training kinaesthetic skills both in a classroom and by distance learning. Most haptic interfaces are being geared towards surgeons, astronauts and mechanics. There are two major advantages of haptics: students can practice in a risk free environment and students can obtain objective, simultaneous feedback (Treviranus, 2003). It would appear however, that this technology, which is in its infancy is very cost prohibitive and extremely specialized.

Another area of research is virtual synethesia. Synethesia is a neurological condition in which a stimulus in one sense modality, is involuntarily elicited in another sense modality (Emerson, 2003). For example, people with synethesetic capabilities might see a car, and because of their mixed modal signals, might perceive the smell of an apple. Current research is geared towards the development of the ability to see with your ears, referred to as artificial synethesia via signification. The ability to induce an artificial or virtual state of synethesia could prove useful in teaching kinaesthetic skills. As with haptics, synethesia research is in its infancy, but is full of potential

benefits. It will be interesting to monitor the ongoing research in this area, with the hope of being able to apply artificial synethesia in classrooms at a future date.

SmartRooms are another manner in which technology is being integrated into instruction. SmartRooms are general-purpose classrooms that have been outfitted to make available presentation capabilities and network connectivity to instructors using computers in their classes as well as VHS or DVD presentations. The SmartRoom will allow the instructor to be multi-modal in his or her presentations. This facilitates the instructor's ability to accommodate the different learning styles of the students. This integration of technology is not meant to dominate the classroom or dwarf the professors. It should be seen as another learning tool. The use of this technology will often engage not only the students, but the professors as well who are able to creatively use the resources before them. Most SmartRooms have the ability to address learners who learn by visual or aural modes. Depending on the curriculum, the SmartRoom has the potential to incorporate kinaesthetic learning, such as learning to type or keyboard, using programs such as Mavis Beacon Teaches Typing.

Through observation, the author has determined that Community colleges, such as George Brown, Seneca and Humber, are now incorporating more SmartRooms in response to the learning needs of what the author refers to as the 'screen generation', in which they learn more via screens (television, computers, etc.) than from sentient beings. Gone, or should one say going, are the days of the traditional lectures. Multi-modal presentations are becoming the norm, not the exception.

Electronic classrooms are arranged into two basic types: *Lecturer* and *Interactive*. The lecture classroom consists of an electronically equipped instructor's station and standard student seating. The interactive classroom offers the same instructor's stations as well as individual computer stations. More and more interactive classrooms are replacing the traditional stenographic classroom in which the sage on the stage conveys information while students write on their steno pads (Allerhand, 2003).

One problem that can arise out of the integration of technologies in the classroom is bifurcated teaching. With bifurcated teaching, the emphasis is placed on the theoretical as opposed to the practical (Sharon Hartnett, personal communication, February 6, 2003). Hartnett argues that the bifurcated approach to teaching may be a result of control issues, time constraints, snobbery or the desire to posture through lecturing without involvement. Based on personal experience, it is the author's belief that this bifurcated approach to teaching is often a result of budgetary restraints and, in the community colleges of Ontario, a focus on general education requirements, rather than the technical skills that students have chosen to study. In one particular college, faculty have been asked to cut back on technical, hands-on kinaesthetic training hours, which are costly, and replace them with low cost classroom experiences. Large demonstration type teaching methods rather than small group experiences are becoming the norm. Faculty members have voiced their displeasure with such set-ups. They feel that the quality of education, and ultimately the students, will suffer.

College administrations, based on either budgetary cutbacks or the personal visions of administrators, seem to be packing more students into classrooms to learn by observation, which often involves the use technology.

Those students are then expected to replicate that which has been taught or demonstrated to them at a later time, be it hours or days.

Such actions conflict with the research on retention rates as identified by Sousa (2001) who notes that after 24 hours, most students' information retention levels are either 20% by audiovisual or 30% by demonstration as opposed to 75% by practice by doing. This research further validates the need of kinaesthetic learning in order to advance knowledge retention rates.

It should be noted that technology, if properly used, has the potential to increase retention rates of theoretical knowledge. This can be achieved by the use of CD-Rom or DVD technologies in which the student has the opportunity to learn and review at his or her own pace. At the same time, instant feedback in a self-directed learning environment is not often readily available, whereas in the traditional classroom setting it usually is.

The apparent weakness with the implementation of current learning technologies is that the needs of kinaesthetic learners are often being neglected. Administrators, who may or may not have educational theory backgrounds, must be reminded that in order to offer quality instruction and education, the needs of all learners, including kinaesthetic ones must be addressed. When approaching technology, theory and kinaesthetic learning one might consider the words of Mao Tse-Tung (1937) who said "If you want the taste of a pear, you must change the pear by eating it yourself...If you want to know the theory and methods of revolution, you must take part in revolution. All genuine knowledge originates in direct experience."

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